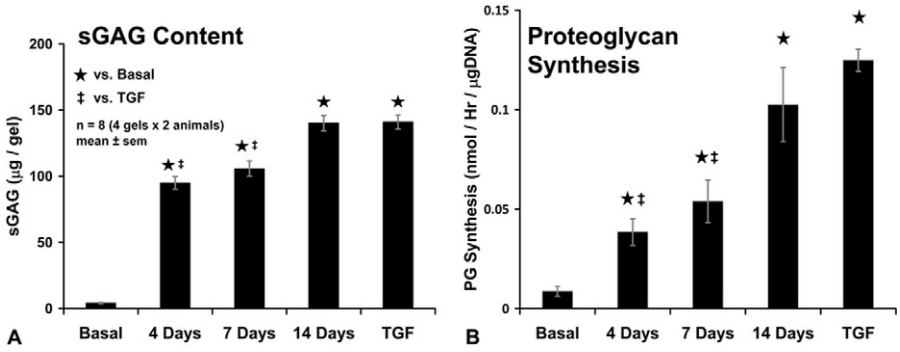
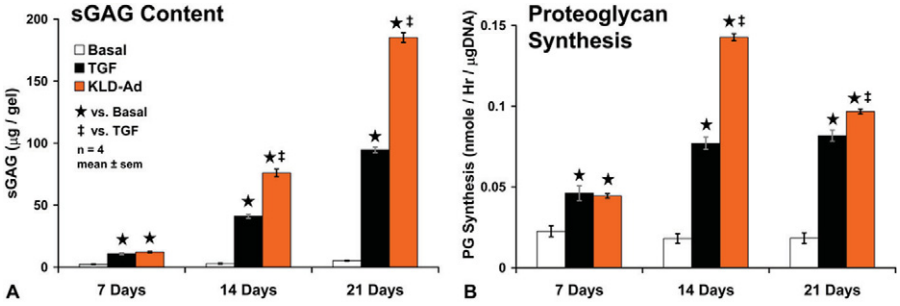


Abstract 480 – Figure 2. TGF-takeaway. 4, 7, or 14 Days indicates time that medium was supplemented with TGF-β1. All gels were cultured for 21 days total.



Abstract 480 – Figure 3. TGF-adsorbed. 4, 7, or 14 Days indicates total time in culture for each group.

to assembly, BMSC chondrogenesis was significantly enhanced compared to traditional TGF supplementation in the media (Fig. 3A & B).

Conclusions: These studies indicate that TGF can adsorb to the KLD peptide and is effectively retained during culture. This phenomenon is enhanced when TGF is mixed with soluble KLD peptide prior to assembly. Additionally, supplementing the culture medium with TGF for only 4 days resulted in BMSC chondrogenesis, indicating that only a short duration of growth factor stimulation may be necessary. Furthermore, when TGF was adsorbed to the peptide prior to assembly, chondrogenesis was significantly enhanced over 21 days, suggesting that the timing and duration of chondrogenic stimuli may be critical. Taken together these data suggest that KLD peptide hydrogels may provide an environment where TGF can be delivered to encapsulated cells over a period of weeks and may be useful for promoting cartilage regeneration *in vivo*. On-going studies are investigating techniques to further augment the utility of the scaffold using modified peptide sequences that specifically bind TGF.

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REPAIR OF EXPERIMENTAL ARTICULAR CARTILAGE DEFECTS IN HORSES BY ARTHROSCOPIC IMPLANTATION OF MATRIX-INDUCED AUTOLOGOUS CHONDROCYTES

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Purpose: Articular cartilage lesions predispose the development of early osteoarthritis. Arthroscopic implantation of matrix-induced autologous chondrocytes (MACI) can be limited by a high fluid flow able to affect cell attachment to the matrix. The goal of this study was evaluate the neo-tissue obtained after arthroscopic implantation of autologous chondrocytes seeded onto a collagen scaffold to repair experimental cartilage lesions in a horse model.

Methods: Arthroscopic osteochondral biopsies were obtained from the medial femoral trochlea of eight horses. Chondrocytes were isolated by collagenase digestion and expanded until confluency. Cells were seeded onto the collagen polymer and encapsulated by lifting a monolayer of autologous chondrocytes. Experimental chondral lesions of four horses were repaired by arthroscopic implantation using MACI. Controls cartilage lesions in four horses with a drill hole were done arthroscopically and left without implant. Two punch biopsy specimens per horse were evaluated by *in situ* hybridization, ESEM, histochemistry and immunohistochemistry six months after *in vivo* implantation to assess morphology and to determinate the presence of proteoglycan, collagen II, collagen I, and also to evaluate integration to the surrounding cartilage.

Results: Viability of the cells seeded onto the polymer was evaluated and most of them were found alive. Consistency of the polymer was ideal for implantation 5 day after cells were seeding *in vivo*. Good attachment of cells to the polymer was observed by ESEM before implantation. After 6 months of implantation the neo- repair tissue showed heterogeneous extracellular matrix with some collagen II positive areas in experimental animals, with a better cellular organization and attachment to subchondral bone and adjacent cartilage. We found arthroscopic differences between experimental and control using a validation scale.

Conclusions: The matrix-encapsulation cell-seeding technique allowed maintaining viable cells within the polymer implant, obtaining a cartilage-like tissue through an arthroscopic procedure.

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